

CLAIMS

What is claimed is:

1. A fluid storage tank, comprising:

a tank frame, comprising

a plurality of vertical support members, each vertical support member

comprising a substantially rigid substantially vertical frame member and

upper and lower brackets secured thereto near respective upper and lower ends thereof,

a plurality of substantially rigid lower cross members, each end of each lower

cross member being connected to the lower bracket of an adjacent one of

the vertical support members so that the plurality of lower cross members

thus connected form a lower closed polygon with one of the vertical support

members positioned at each vertex thereof,

a plurality of substantially rigid upper cross members, each end of each upper

cross member being connected to the upper bracket of an adjacent one of

the vertical support members so that the plurality of upper cross members

thus connected form an upper closed polygon with one of the vertical

support members positioned at each vertex thereof, the upper polygon

substantially corresponding in size and shape to the lower polygon; and

a tank liner, comprising

a polygonal bottom panel, substantially corresponding in size and shape to the

upper and lower polygons,

a plurality of substantially vertical side panels, each side panel secured at a

lower edge thereof to an edge of the polygonal bottom panel and at side

edges thereof to side edges of adjacent side panels, each side panel

having a liner sleeve running along an upper edge thereof open at both

ends and substantially corresponding to a side of the upper polygon, the

liner sleeves being spaced apart by liner gaps therebetween, each liner gap

corresponding to a vertex of the upper polygon,

wherein:

1 each upper cross member is positioned within a corresponding one of the liner
2 sleeves, and each of the upper brackets is positioned at a corresponding one of
3 the liner gaps,
4 each of the upper and lower cross members is connected to the respective upper
5 and lower brackets so as to allow relative angular motion between the vertical
6 frame members and the connected upper and lower cross members.

7 2. The apparatus of Claim 1, wherein the fluid storage tank may be repeatedly
8 disassembled into separate tank liner, vertical support members, lower cross
9 members, and upper cross members, and repeatedly reassembled.

10 3. The apparatus of Claim 2, wherein the tank liner, vertical support members, lower
11 cross members, and upper cross members together weigh less than about 110
12 pounds, and the capacity of the assembled tank is greater than about 1000 gallons.

13 4. The apparatus of Claim 2, wherein all of the upper and lower cross members are
14 substantially identical.

15 5. The apparatus of Claim 2, further comprising a carrying container, wherein the tank
16 liner, vertical support members, lower cross members, and upper cross members all
17 fit into the container together.

18 6. The apparatus of Claim 5, wherein:
19 the container with the tank liner, vertical support members, lower cross members,
20 and upper cross members together therein weighs less than about 150 pounds;
21 the length of the container with the tank liner, vertical support members, lower cross
22 members, and upper cross members together therein is less than about 108
23 inches;
24 a sum of the length and the girth of the container with the tank liner, vertical support
25 members, lower cross members, and upper cross members together therein is
26 less than about 130 inches; and
27 the capacity of the assembled tank is at least 1000 gallons.

- 1 7. The apparatus of Claim 1, wherein the tank liner includes a drain opening and a
2 closure therefor.
- 3 8. The apparatus of Claim 1, wherein:
4 each of the upper and lower brackets includes a pair of transverse bracket tabs;
5 each of the upper and lower cross members comprises an elongated hollow
6 member; and
7 each transverse bracket tab is received within an open end of the corresponding
8 cross member when the corresponding cross member is connected to the
9 corresponding bracket.
- 10 9. The apparatus of Claim 8, wherein each upper and lower cross member has a
11 transverse hole at each end thereof, and each end of each cross member is
12 connected to the corresponding bracket by a retaining pin received within the hole.
- 13 10. The apparatus of Claim 9, wherein each retaining pin is retractably mounted on a
14 corresponding one of the transverse bracket tabs.
- 15 11. The apparatus of Claim 9, wherein each retaining pin acts as a pivot for relative
16 angular motion between the corresponding vertical frame member and connected
17 cross member.
- 18 12. The apparatus of Claim 8, wherein each transverse bracket tab is smaller than the
19 corresponding open end of the corresponding cross member so that relative motion
20 of the bracket tab within the open end of the cross member enables relative angular
21 motion between the corresponding vertical frame member and connected cross
22 member
- 23 13. The apparatus of Claim 1, wherein a range of relative angular motion allowed
24 between the vertical frame members and the connected upper and lower cross
25 members is between about $\pm 1^\circ$ and about $\pm 6^\circ$.

- 1 14. The apparatus of Claim 13, wherein a range of relative angular motion allowed
2 between the vertical frame members and the connected upper and lower cross
3 members is between about $\pm 3^\circ$ and about $\pm 5^\circ$.
- 4 15. The apparatus of Claim 1, wherein the upper and lower polygons each have at least
5 five sides.
- 6 16. The apparatus of Claim 15, wherein the upper and lower polygons each have eight
7 sides.
- 8 17. A method for assembling a fluid storage tank, comprising:
9 connecting a plurality of substantially rigid lower cross members to lower brackets of
10 a plurality of vertical support members, each vertical support member
11 comprising a substantially rigid substantially vertical frame member and upper
12 and lower brackets secured thereto near respective upper and lower ends
13 thereof, each lower cross member being connected at each end thereof to the
14 lower bracket of one of the vertical support members so that the plurality of
15 lower cross members thus connected form a lower closed polygon with one of
16 the vertical support members positioned at each vertex thereof, each of the
17 lower cross members being connected to the respective lower bracket so as to
18 enable relative angular motion between the vertical frame members and the
19 connected lower cross members;
20 inserting each of a plurality of substantially rigid upper cross members into a
21 corresponding liner sleeve of a tank liner, the tank liner comprising
22 a polygonal bottom panel, substantially corresponding in size and shape to the
23 lower polygon,
24 a plurality of substantially vertical side panels, each side panel secured at a
25 lower edge thereof to a side edge of the polygonal bottom panel, each side
26 panel having a liner sleeve running along an upper edge thereof open at
27 both ends and substantially corresponding to a side of the lower polygon,
28 the liner sleeves being spaced apart by liner gaps therebetween, each liner
29 gap corresponding to a vertex of the lower polygon;

1 positioning the tank liner and upper cross members within the lower polygon with
2 each of the liner gaps positioned at a corresponding one of the vertical support
3 members; and
4 connecting the plurality of upper cross members to the upper brackets of the vertical
5 support members, each upper cross member being connected at each end
6 thereof to the upper bracket of one of the vertical support members so that the
7 plurality of upper cross members thus connected form an upper closed polygon
8 with one of the vertical support members at each vertex thereof, the upper
9 polygon substantially corresponding in size and shape to the lower polygon,
10 each of the upper cross members being connected to the respective upper
11 bracket so as to enable relative angular motion between the vertical frame
12 members and the connected upper cross members.

13 18. The method of Claim 17, further comprising disassembling the fluid storage tank,
14 wherein disassembling the tank comprises:
15 disconnecting the upper cross members from the corresponding upper brackets;
16 removing the upper cross members from the respective liner sleeves; and
17 disconnecting the lower cross members from the corresponding lower brackets.

18 19. The method of Claim 18, further comprising repeatedly disassembling and
19 repeatedly reassembling the fluid storage tank.

20 20. The method of Claim 18, wherein the tank liner, vertical support members, lower
21 cross members, and upper cross members together weigh less than about 110
22 pounds, and the capacity of the tank is greater than about 1000 gallons.

23 21. The method of Claim 18, wherein all of the upper and lower cross members are
24 substantially identical.

25 22. The method of Claim 18, further comprising:
26 folding the tank liner; and
27 packing the folded liner, the upper and lower cross members, and the vertical
28 support members together in a carrying container.

1 23. The method of Claim 22, wherein:

2 the container with the tank liner, vertical support members, lower cross members,
3 and upper cross members together therein weighs less than about 150 pounds;
4 the length of the container with the tank liner, vertical support members, lower cross
5 members, and upper cross members together therein is less than about 108
6 inches;

7 a sum of the length and the girth of the container with the tank liner, vertical support
8 members, lower cross members, and upper cross members together therein is
9 less than about 130 inches; and

10 the capacity of the assembled tank is at least 1000 gallons.

11 24. The method of Claim 17, wherein the tank liner includes a drain opening and a
12 closure therefor.

13 25. The method of Claim 17, wherein each of the upper and lower brackets includes a
14 pair of transverse bracket tabs, and each of the upper and lower cross members
15 comprises an elongated hollow member, the method further comprising inserting
16 each transverse bracket tab into an open end of the corresponding cross member
17 for connecting the corresponding cross member to the corresponding bracket.

18 26. The method of Claim 25, wherein each upper and lower cross member has a
19 transverse hole at each end thereof, and each end of each cross member is
20 connected to the corresponding bracket by a retaining pin received within the hole.

21 27. The method of Claim 26, wherein each retaining pin is retractably mounted on a
22 corresponding one of the transverse bracket tabs.

23 28. The method of Claim 26, wherein each retaining pin acts as a pivot for relative
24 angular motion between the corresponding vertical frame member and connected
25 cross member.

26 29. The method of Claim 25, wherein each transverse bracket tab is smaller than the
27 corresponding open end of the corresponding cross member so that relative motion
28 of the bracket tab within the open end of the cross member enables relative angular

1 motion between the corresponding vertical frame member and connected cross
2 member

3 30. The method of Claim 17, wherein a range of relative angular motion allowed
4 between the vertical frame members and the connected upper and lower cross
5 members is between about $\pm 1^\circ$ and about $\pm 6^\circ$.

6 31. The method of Claim 30, wherein a range of relative angular motion allowed
7 between the vertical frame members and the connected upper and lower cross
8 members is between about $\pm 3^\circ$ and about $\pm 5^\circ$.

9 32. The method of Claim 17, wherein the upper and lower polygons each have at least
10 five sides.

11 33. The method of Claim 32, wherein the upper and lower polygons each have eight
12 sides.

13 34. The method of Claim 17, further comprising:
14 prior to assembling the tank, transporting the tank liner, vertical support members,
15 lower cross members, and upper cross members to a location near a fire in a
16 remote area;
17 assembling the tank at the remote location;
18 after assembling the tank, filling the tank with water at the remote location.

19 35. The method of Claim 34, further comprising pumping water from the tank to
20 suppress the fire.

21 36. The method of Claim 34, further comprising pumping water from the tank to another
22 tank at a higher elevation.

23 37. The method of Claim 34, further comprising disassembling the tank and transporting
24 the tank out of the remote area.

25 38. A fluid storage tank, comprising:
26 a tank frame, comprising

1 a plurality of substantially rigid substantially vertical frame members,
2 a plurality of substantially rigid lower cross members,
3 a plurality of substantially rigid upper cross members,
4 means for connecting each end of each lower cross member to a corresponding
5 vertical frame member near a lower end thereof so as to allow a range of
6 relative angular motion between the vertical frame member and the
7 connected lower cross member, the lower cross members thus connected
8 forming a lower closed polygon with one of the vertical frame members
9 positioned at each vertex thereof,
10 means for connecting each end of each upper cross member to a
11 corresponding vertical frame member near an upper end thereof so as to
12 allow a range of relative angular motion between the vertical frame member
13 and the connected upper cross member, the upper cross members thus
14 connected forming an upper closed polygon with one of the vertical frame
15 members positioned at each vertex thereof, the upper polygon substantially
16 corresponding in size and shape to the lower polygon; and
17 a tank liner, comprising
18 a polygonal bottom panel, substantially corresponding in size and shape to the
19 upper and lower polygons,
20 a plurality of substantially vertical side panels, each side panel secured at a
21 lower edge thereof to an edge of the polygonal bottom panel, each side
22 panel having a liner sleeve running along an upper edge thereof open at
23 both ends and substantially corresponding to a side of the upper polygon,
24 the liner sleeves being spaced apart by liner gaps therebetween, each liner
25 gap corresponding to a vertex of the upper polygon,
26 wherein each upper cross member is positioned within a corresponding one of the
27 liner sleeves, and each of the vertical frame members is positioned at a
28 corresponding one of the liner gaps.

29 39. The apparatus of Claim 38, wherein the fluid storage tank may be repeatedly
30 disassembled into separate tank liner, vertical frame members, lower cross
31 members, and upper cross members, and repeatedly reassembled.

- 1 40. The apparatus of Claim 39, further comprising a carrying container, wherein the
2 tank liner, vertical support members, lower cross members, and upper cross
3 members all fit into the container together.
- 4 41. The apparatus of Claim 40, wherein:
5 the container with the tank liner, vertical support members, lower cross members,
6 and upper cross members together therein weighs less than about 150 pounds;
7 the length of the container with the tank liner, vertical support members, lower cross
8 members, and upper cross members together therein is less than about 108
9 inches;
10 a sum of the length and the girth of the container with the tank liner, vertical support
11 members, lower cross members, and upper cross members together therein is
12 less than about 130 inches; and
13 the capacity of the assembled tank is at least 1000 gallons.
- 14 42. The apparatus of Claim 38, wherein a range of relative angular motion allowed
15 between the vertical frame members and the connected upper and lower cross
16 members is between about $\pm 1^\circ$ and about $\pm 6^\circ$.
- 17 43. The apparatus of Claim 42, wherein a range of relative angular motion allowed
18 between the vertical frame members and the connected upper and lower cross
19 members is between about $\pm 3^\circ$ and about $\pm 5^\circ$.
- 20 44. The apparatus of Claim 38, wherein the upper and lower polygons each have at
21 least five sides.
- 22 45. The apparatus of Claim 44, wherein the upper and lower polygons each have eight
23 sides.
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